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The Acquisition of English Syllable Timing by Native Spanish Speakers Learners of English. An Empirical Study'

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ABSTRACT

In this article we present part of the results of an empirical research on contrastive rhythm (English-Spanish). Of the several points dealt with in such a rcsearch (syllable compression, foot timing, syllable timing and isochrony of rhythmic units), we refer here to syllable duration in English and Spanish as well as the leaming of syllable duration by a group of advanced leamers of English whose first language is Spanish. Regarding the issue of syllable timing, a striking result is the equal duration of unstressed syllables in both languages, which challenges an opposite view underlying a teaching practice common among Spanish teachers of English to Spanish learners of that language. As for the interlanguage of the group of Spanish leamers of English, we comment on the presence of an interference error represented by a stressed/unstressed durational ratio mid way between the ratios for Spanish and English; we have also detected a developmental error related to the tempo employed by the leamers in their syllable timing, which is slower than the tempo produced by native speakers of English.

KEYWORDS: Contrastive prosody, rhythm, timing, SLA, interlanguage phonology.

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I. INTRODUCTION

The contents of the present article are part of the wider scope of an empirical reasearch carried out by me on timing and rhythm in Spanish and English as well as on the rhythmic interlanguage of two groups of learners: a group of native Spanish speakers learners of English and a group of native English speakers learners of Spanish. Of the various research aims and related results obtained in that study, I shall refer here to a contrastive view of the timing of stressed and unstressed syllables in both English and Spanish together with some pedagogical implications for the teaching of English to native Spanish speakers. Linked to the results of this partial study is a tentative explanation of the hypothesis "contrastive perception of syllable timing"; this hypothesis could be considered as part of a more general hypothesis which I have termed "contrastive perception of rhythrn" in previous work (Gutiérrez, 1998-99). In accordance with the above-referred scope restriction, I shall only present here those aspects of the overall study -samples, procedures, corpus, results and conclusions- pertaining to the objective singled out for the present report.

II. THE ROLE OF SYLLABLE LENGTH IN ENGLISH AND SPANISH

Syllabic length has two main roles in English and Spanish. The first one, shared with pitch and loudness in various trading relationships, is to act as a correlate of linguistic stress. The second one is to actas a fundamental ingredient in the organization of rhythm and rhythmicality (Crystal 1969). Regarding its status as a stress correlate, syllable duration has been accorded different degrees of importance in the two languages by different authors — alwaysdependent on the other two competing stress correlates, pitch and loudness.

In the competition for ordered priority within a scale of stress correlates, authors seem almost unanimous in ranking loudness as the least important factor. In English, pitch is slightly ahead of duration in most reports (Fry 1955, Bolinger 1958; Adams 1979; Couper-Kuhlen 1986; Kreidler 1989). Regarding Spanish, opinions seem more divided on the issue. Pitch is considered as the main stress correlate by Bello (1949), Real Academia Española (1959), Monroy (1980), Solé (1985), and Figueras & Santiago (1993), while syllable duration would come first according to Gili Gaya (1975), Bolinger-Hoppard (1961), Contreras (1963) and Ríos *et al*. (1988).

The second role of syllable duration has to do with the organization of rhythm. Within the temporal view of linguistic rhythm (Pike, 1945; Abercrombie, 1967) syllable length is central in the structuring of isochrony, be it of stressed-timed units in stressed-timed languages or of syllable-timed units in syllable-timed languages.

As for the non-temporal view ofrhythm (Faure *et al.*, 1980), which sees it simply in terms of the alternation of stressed and unstressed syllables, syllable duration is indirectly relevant,

since it is one of the three correlates of stress, clearly superseding loudness and in close competition with pitch, as we pointed out above.

According to Jassem et *al.* (1984), with the exception of monosyllabic feet, in which the stressed syllable is longer than in polysyllabic feet, in the latter type of foot both stressed and unstressed syllables have equal duration:

> Individual syllables within a multisyllable NRU *[or "narrow rhythmic unit", which is the equivalent of Abercrombie's rhythmic foot]* tend to be of equal length, i.e., the complete length of a polisyllabic NRU tends to be somewhat equally divided among the constituent syllables
>
> ***Jassem et al. (1984: 206)***

Although syllable duration in English is tightly related to the question of foot isochrony and syllable compression as a means for achieving it, both questions fall out of the scope of the present report.

Regarding Spanish, though, when linguists talk about its syllable-timed rhythm or syllabic isochrony, they are basing their rhythmic stand on the assumption that both stressed and unstressed syllables have equal duration or nearly so. O'Connor (1968), Olsen (1972), Hoequist (1983) and several others seek to solve the skewing between postulated isosyllabism and the inevitable variability of physical syllable duration found in several corpora by stating that isosyllabism is ultimately a perceptual construct.

Hoequist (1983) contends that durational variability due to the presence/absence of stress is specific to each language. Olsen offers a stressed/unstressed durational ratio of 1.16 for a half hour talk of a Mexican speaker. Gili Gaya (1940) found a ratio of 1.39 in phonic-group non-final position for a brief prose passage read aloud by a Castilian speaker. Delattre (1966) analysed 5 minutes of spontaneous speech (presumably produced by South American speakers) and found a ratio of 1.23 in non-final position within the phonic group.

Cuenca (1997) offers the following ratios: 2.79 for an English prose passage read aloud and 1.71 for a stretch of English spontaneous conversation; 1.22 for a Spanish prose passage read aloud and 1.10 for a stretch of Spanish spontaneous conversation.

III. ON PHONOLOGICAL LEARNING

The strong hypothesis on contrastive analysis (Lado, 1957) was modulated by the weak version based on error analysis (Wardaugh, 1970). The former attempted to predict interference errors as stemming from L2 items wich were dissimilar to L1 items; the latter explained some errors in terms of interference stemming from L2 items which were similar to L1 items. Errors came to constitute interlanguage features (Selinker, 1972). Both interference and developmental errors (Archibald, 1993; Leather, 1999; Major; 1987) have survived as broad categories amid long-lived

discussions on the nature of language learning. Nurnerous learning hypotheses have been offered to account for phonological learning. Their explanations are based on dichotomies such as differencelsirnilarity between target and rnother tongue iterns, rnarkedlunrnarked character of the iterns to be learned, and rate of learning of the elernents specified in the afore-rnentioned dichotomies through different learning stages.

Related to the dichotorny differencelsirnilarity we have Flege's ***Perceptual** Target **Approach*** (Flege,1981), Kuhl's ***Native Language** Magnet,* (Kuhl, 1991; lnverson and Kuhl, 1995), and Major's ***Ontogeny Model*** (Major, 1987). Based on the rnarkedlunrnarked dichotorny are Eckman's ***Marked** Differential **Hypothesis*** (Eckman,1977), later on rnodified as the *Structural **Conforrnity Hypothesis*** (Eckrnan, 1991), and Carlisle's *Intralingual **Marked Hypothesis.*** A cornbination of the dichotomies similarity/difference and marked/unmarked with rate of adquisition through learning stages underlies Major and Kirn's (1999) *Similarity Differential **Rate Hypothesis.***

lf we rnention the main hypotheses which have been used in connection with phonological learning, it is to stress the fact that in practice phonological leaming has been restricted to segmental phonological learning, and, to rny knowledge, those hipotheses have not been used to account for tirning errors, which, by the way, fall within the scope of the present report. The lack of application of such hypotheses to account for rhythrnical learning and the learning of tirning is probably due to the fact that concepts such as *similarity, dissimilarity, **rnarkedand unrnarked*** are easier to apply to discrete units (segrnents, syllables, etc.) than to non-discrete ones. Rhythmic learning can best be explained in terms of more or less of features (like stress-tirning and syllable-tirning) which are increasingly viewed as scalar. We could safely say that prosodic universals are far frorn established; let alone the related notions of sirnilarity and rnarkedness at the prosodic level. Whatever one has to say about learning rate (and, consequently, about hypotheses conternplating such learning variable) rnust be based on longitudinal studies, and ours only conternplates a group of advanced SL learners. Therefore, we shall be content with detecting and typifying the tirning errors present in our group of English learner's interlanguage as either interference or developrnental errors. We will appeal to Flege's hypothesis, though, for a tentative explanation of one of the errors.

IV. OBJECTIVES

As advanced in the introduction, two are the objectives we shall focus on in the present report:

1. **A** comparison of syllable tirning in English and Spanish. It is our intention to find out to what extent there are rneaningful intralinguistic and interlinguistic durational differences between stressed and unstressed syllables in the two languages.

2. The pursuit of the previous objective will be supplernented by a consideration of the pedagogical irnplications for the teaching/learning of English to/by Spanish speakers. To that effect we shall analyse syllable tirning in the interlanguage of a group of Spanish speakers learners of English.

V. THE STUDY

Although a summary of the experimental design was first presented in Gutiérrez (1996) and a more detailed account was given in Gutiérrez (1998-1999), we reproduce it here for easier reference but with sorne fundamental changes in scope. In the two works cited different aspects of three *corpora* produced by as rnany groups of speakers were analysed:

a. Spanish by native speakers (G-1)
b. English by native speakers (G-2)
c. Spanish by English speakers learners of Spanish (G-3)

In the present study, corpus (a) and (b) are used again but corpus (c) is absent, and instead a corpus of English produced by a group of Spanish speakers learners of English is used under the narne G-3 in accordance with the second objective set up in the previous paragraph.

V.1. Samples

Seven Spanish speakers, all of thern students in their last year of studies in English Philology at the University of Murcia, Spain, were used in the study, first as rnernbers of G-1 (that is, as native readers of a Spanish text), then as rnernbers of G-3 (that is, as non-native readers of an English text). The inforrnants, advanced learners of EFL (English as a Foreing Language) were randornly chosen; frorn the Murcia region, they are all educated speakers of Standard Spanish, in sorne cases with a light aspiration of [s] in coda position. 7 educated native speakers of English were chosen to forrn group G-2 (that is, as native readers of an English text). 3 of the British speakers were students at Salford University and the remaining 4 studied at Essex University; they were all RP speakers in their final year of studies.

V.2. Instrument

Two texts were used, an English text and a Spanish text, each consisting in the transcription of a combine of extracts of various televised (80% of the total) or radioed (the rernaining 20 %) dialogues, which were illustrative of colloquial speech constrained only by the presence of

cameras or microphones during their production. An extract of both texts is shown in the Appendix.

V.3. Procedure

The Spanish text was read aloud by the G-1 informants. The English text was read aloud by both the the G-2 and G-3 informants. The reading output for each of the 3 groups of informants lasts some twenty minutes. Previous to the reading-aloud stage, the informants were allowed to read the text silently in order to get familiarised with its content and thus minimise the number of false starts and pauses during the reading-aloud process. Also previous to their reading aloud, the informants were instructed to read at normal speed, that is, with the speed of somebody speaking spontaneously in public[2]. The readings of the G-1 and the G-3 speakers were recorded in a "Radio Nacional" recording studio in Murcia, using an AEQ mixing deck with a REVOX open-reel master recorder and an AKG-190 unidirectional and cardioid microphone. The recordings were subsequently transferred on to a cassete tape (using a TASCAM 122K cassette recorder) for use in a phonetics laboratory.

Three G-2 members were recorded in a recording studio at Salford University using a SONY F-30 michrophone and a DTC 1000ES mixing deck with a SONY open-reel master recorder whose contents were transferred later on to a cassette tape (using a TAMBERG AT-771) for use in the phonetics laboratory. The other 4 components of G-2 were recorded at the University of Essex using a SONY-DTC-57ES cassette recorder and a 7-730 unidirectional and cardioid michrophone.

Two groups ofjudges were used in order to determine the actual stress placement in the recorded texts by the 3 groups of readers. One group ofjudges was formed by 9 educated native speakers of Spanish who had to determine stress placement as produced by the G-1 members (Spanish by native readers). The other group ofjudges was formed by 9 educated native speakers of English who had to determine stress placement as produced by both G-2 (English by native readers) and G-3 (English by non-native readers) members. Since the judges were linguistically naive, they were asked to tick the syllables which they heard as "prominent" in the speech chain as they listened to the short utterances into which the text had been divided. Each utterance was sounded only twice for the judges in order to minimise their expectancy of stress (only those syllables heard as prominent should be marked, not those the judges thought ought to be prominent). After the stresses had been adjudicated, only those syllables judged as stressed by two thirds of the judges were computed as such by the researcher.

The 3 ***corpora*** thus obtained (one for G-1, another for G-2 and a third for G-3) were divided into tone units in order to discard from our counts the syllables falling under the 'tonic segments' (or 'nuclear tones') of the tone units. Such a decision surely begs an explanation: we should remember at this stage that the present account —length of stressed and unstressed

syllables in English and Spanish — is only a small part of the wider scope of our original research, which covered, arnong other things, tirning of various units and rhythrnic organization in the two languages. It is no secret that the constraints on the rhythrnic organization of the pretonic segrnent (or "head") are different frorn those operating at the tonic segrnent. In the latter, syllable duration tends to be longer than in the pretonic segrnent and this holds true for both stressed and unstressed syllables. Furthermore, in the tonic segrnent durational differences between stressed and unstressed syllables are easily levelled out. Moreover, the unstressed syllables can be noticeably longer than the (stressed) nuclear syllable due to the slurring effect deterrnined, arnong other things, by their final position within tone unit, by the nuclear-tone type (simple, cornplex, etc.), and by the nurnber ofnuclear tone-bearing syllables. This fact allows the researcher, at least frorn an operational standpoint, to restrict the analysis of linguistic rhythrn to the pretonic segrnent, where syllable tirning and rhythrnic organization can be said to be, if not totally independent from intonation, at least not affected by nuclear tones.

For the division of the corpora into tone units the same criteria were used as in Gutiérrez (1983 and 1995); we will sirnply list thern here:

a. Jurnp to a high pitch level after a falling tone.
b. Jurnp to a low pitch level after a rising tone.
c. Jurnp to a high or a low level after a level tone.
d. Extra-length of nuclear tone-bearing syllables.
e. *Anacrusis* after final unstressed syllables in a tone unit.

Ornitted frorn our count were also syllables belonging to rhythrnic feet which had been fragrnented by the readers' false starts or hesitationpauses. The rest ofthe syllables, that is, those which had not been affected by the constraints rnentioned above were ready for durational measurements. Recordings were digitalised by rneans of an AD convertor of the type CED-1401, and syllable duration was rneasured on the oscillographic display using the "Waterfall" prograrn (Carnbridge University) to that effect.

The following criteria were adopted regarding durational rneasurernents:

a. All stressed syllables, that is, those at rhythmical "ictus" position were rneasured.
b. The rerniss of all rhythrnic feet, that is, the stretch of unstressed syllables in each foot, was also rneasured. In this way we skipped or minirnised the troubles involved in setting boundaries between every single pair of phones in an utterance and —to a great extent— between syllables. It was only necessary to establish the boundaries between ictus and rerniss. Dividing total duration of each rerniss by the number of unstressed syllables in it, we got average durations for unstressed syllables.
c. Regarding plosive consonants, their rneasurement started at the plosion stage when they occurred word-initially (i.e., after silence), and at the closing point when followed

by silence. In utterance mid-position we followed Well's (1990) criteria for syllable delimitation in English; in Spanish, plosives always occur at syllable heads and were thus computed as part of such heads.

VI. DISCUSSION OF RESULTS

V.1. Results pertaining to groups G-1 (Spanish by native speakers) and G-2 (English by native speakers)

We have compared Spanish stressed and unstressed syllables (as produced by native Spanish speakers) with their English counterparts (as produced by native English speakers). Using a t-test to compare the mean difference in durational values for the non-related groups G-1 and G-2, the following meaningful results were found:

a. The mean duration of tonic syllables is smaller in Spanish than in English.

b. The mean duration of unstressed syllables is the same in both languages.

NSF	GROUP	N	MEAN DURATION	STANDARD DEVIATION	df	t-VALUE	PROB
1	G-1	17	211.57	45.51			
					37	-1.80	0.079
	G-2	22	244.58	63.64			
2	G-1	62	150.80	49.22			
					161	-6.45	0.000
	G-2	111	206.53	55.97			
3	G-1	158	151.08	49.85			
					328	-8.73	0.000
	G-2	72	200.56	52.97			
4	G-1	162	148.10	59.20			
					235	-7.94	0.000
	G-2	75	213.45	58.41			
5	G-1	53	195.60	50.10			
					81	1.40	0.166
	G-2	30	178.94	54.37			
6	G-1	38	154.19	44.04			
					47	-2.82	0.007
	G-2	11	195.74	39.35			
7	G-1	13	193.13	101.59			
					13	0.24	0.813
	G-2	2	175.20	3.96			

Table 1a: t-test to compare the partial mean durational values (for each type of foot) of stressed syllables of groups G-1 y G-2. The mean durations of stressed syllables of group G-1 are shorter than those of G-2, except for 1, 5 and 7-syllable feet (NSF = number of syllables per foot), in which durational differences are not meaningful (for 1-syllable feet, the mean duration is shorter in Spanish than in English; for 5 and 7-syllable feet, the mean duration is longer in Spanish than in English).

	GROUP	N	MEAN DURATION	STANDARD DEVIATION	df	t-VALUE	PROB
Tonic syllable	G-1	509	158.58	57.26	923	-12.33	0.000
	G-2	416	204.80	56.00			

Table 1b: t-test to compare theglobal mean duration ofstressed syllables ofgroups G-1 and G-2. The mean duration of stressed syllables is significantly shorter for G-1 than for G-2.

NSF	GROUP	N	MEAN DURATION	STANDARD DEVIATION	df	t-VALUE	PROB
I	G-1	—					
	G-2	—					
2	G-1	62	111.56	32.32	160.72	-0.13	0.895
	G-2	111	112.46	55.14			
3	G-1	158	115.71	41.31	328	0.91	0.361
	G-2	72	111.72	38.10			
4	G-1	162	117.13	26.46	101.05	-6.18	0.538
	G-2	75	120.45	42.81			
5	G-1	53	116.21	34.51	81	2.57	0.012
	G-2	30	97.93	23.86			
6	G-1	38	119.13	18.11	47	0.72	0.477
	G-2	11	114.31	21.89			
7	G-1	13	112.83	30.59	13	0.37	0.716
	G-2	2	104.50	9.45			

Table 2a: t-test to compare the partial mean durational values (for each type of foot) of unstressed syllables for groups G-1 and G-2. The mean durations of unstressed syllables for group G-1 are the same as those for G-2, except for 5-syllable feet, in which the mean duration of unstressed syllables for G-1 is longer than the mean duration of the unstressed syllables for G-2.

	GROUP	N	MEAN DURATION	STANDARD DEVIATION	df	t-VALUE	PROB
Non-tonic syllable	G-1	492	116.05	33.00	724.36	1.31	0.188
	G-2	394	112.60	42.82			

Table 2b: t-test to compare the global mean duration of stressed syllables for groups G-1 and G-2. The mean duration of unstressed syllables for G-1 is the same as that for G-2.

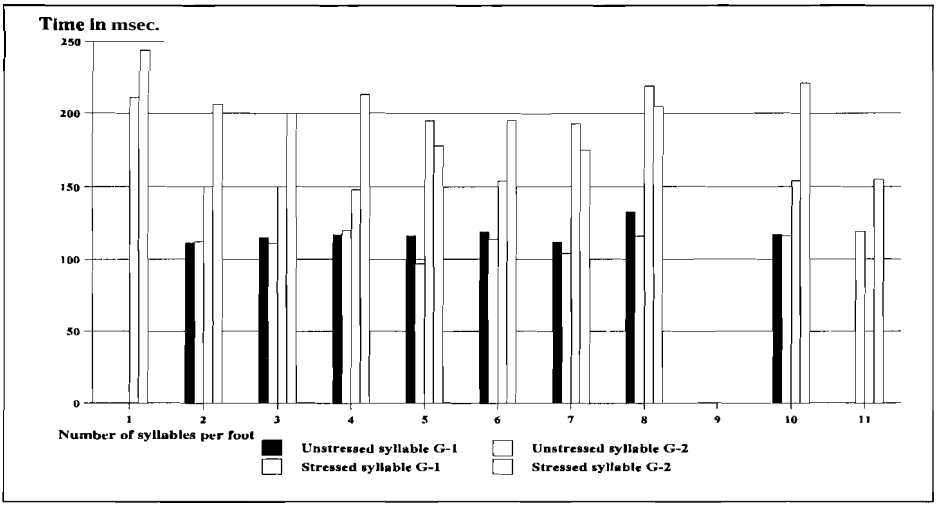

Figure 1: Comparison of tonic and non-tonic syllables by native Spanish speakers (group G-1) and native English speakers (G-2). Inter-group comparison showed a significant difference in length for tonic syllables and no significant difference for non-tonic syllables

The details of the comparison appear in Tables IA-B (for stressed syllables) and 2A-B (for unstressed syllables). In Figure 1 an histogram shows the same comparison of stressed and unstressed syllables in Spanish (G-1) and English (G-2).

Among the above results, the one relating to the equal mean duration of unstressed syllables in both languages is particularly striking. Since the text-production conditions were the same for both groups of speakers (reading aloud at normal speed), confirmation of this finding in new experiments involving a similar type of speech (reading aloud) in languages other than English and Spanish would bring support to what appears as an emerging phonetic universal regarding the equal duration of unstressed syllables. A serious impediment against such possibility, though, seems to be the interlinguistic durational differences caused by variation in speaking rate as reported by Bertinetto (1981): this author suggests that an increase in the speaking rate brings about a proportional reduction in the duration of both stressed and unnstressed syllables in syllable-timed languages (such as Spanish), whereas the same increase would cause a greater compression in unstressed syllables than in stressed ones in stressed-timed languages (such as English). Since our own study does not include the speaking rate variable, we cannot test Bertinetto's suggestion.

In the meantime a pedagogically far-reaching feature of our finding is that it runs counter to a well-established prejudice among Spanish teachers of English. A common piece of advise heard in EFL classrooms filled with native Spanish-speaking students runs as follows: "you should make English stressed syllables much longer than the Spanish ones and the English unstressed syllables much shorter than the Spanish ones". In the light of our data, the first part

of the admonition seems adequate, but the second one would be utterly misleading. Such advice is, no doubt, rooted in the native Spanish speaker's impression of excessive shortening of unstressed syllables in native English speech. Such an irnpression is triggered by the fact that stressed syllables are markedly longer in English than in Spanish (see Tables 1A-B). The durational difference between English stressed and unstressed syllables is attributed by the Spanish-minded ear partly (and rightly) to the longer length of English stressed syllables in cornparison with the Spanish ones, and partly (and also wrongly) to a would be (but non-existent) shorter duration of unstressed syllables in English than in Spanish.

This subjective perception of English tirning by native speakers of Spanish is related to what Gutiérrez (1996) calls "contrastive perception of rhythm", and could be termed "contrastive perception of syllable timing"

NSF	GROUP	N	MEAN RATIO	STANDARD DEVIATION	df	t-VALUE	PROB
1	G-1	—					
	G-2	—					
2	G-1	62	1.47	0.64			
					161	-4.21	0.000
	G-2	101	2.27	1.40			
3	G-1	158	1.51	1.07			
					328	-4.63	0.000
	G-2	172	2.06	1.07			
4	G-1	162	1.42	1.30			
					235	-3.52	0.001
	G-2	75	2.00	0.91			
5	G-1	53	1.92	1.23			
					81	-0.01	0.003
	G-2	30	1.93	0.70			
6	G-1	38	1.34	0.48			
					47	-2.52	0.015
	G-2	11	1.79	0.65			
7	G-1	13	1.96	1.30			
					13	0.29	0.773
	G-2	2	1.68	0.11			

Table 3a: t-test to compare partial mean stressed/unstressed durational ratios forgroups G-1 and G-2. The mean durational ratios for G-1 are significantly smallerthan the mean durational ratios for group G-2. except in 7-syllable feet, in which the ratio for G-1 is greater than the ratio for G-2.

	GROUP	N	MEAN RATIO	STANDARD DEVIATION	df	t-VALUE	PROB
Ratio	G-1	486	1.52	1.11			
					842.54	-7.48	0.000
	G-2	391	2.08	1.11			

Table 3b: t-test to compare the global mean durational ratios (R) for groups G-1 (Spanish by native speakers) and G-2 (English by native speakers). The ratios are significantly different ($P < 0{,}05$ *56).* Since H_0: R for G-1 = R for G-2, and H_1: R for G-1 ≠ R for G-2, we accept H_1: R for G-1 < R for G-2.

A comparison of the mean durational ratio for stressed/unstressed syllables in English with the same type of ratio for Spanish by a t-test shows that the ratio for Spanish (1.52) is significantly smaller than the ratio for English (2.08). The terms of the comparison appear in Tables 3A-B. The extent of the difference in stressed/unstressed ratios between English and Spanish found in our data confirms Hoequist's statement in the sense that, from among the many factors determining syllable duration, only the presence/absence of stress can determine language-specific durational differences between stressed and unstressed syllables.

It is also possible to consider the contrastive durational ratios of English and Spanish as indexes for the explanation of the contrastive perception of English syllable timing by Spanish ears in the terms referred above. It is as if the durational ratio of English (2.08), substantially greater than the Spanish one (1.52), were misinterpreted by the Spanish listeners in terms of their attributing to English unstressed syllables a shorter duration than they actually have.

V.2. Results relative to group *G-3* (English by non-native speakers)

The partial mean durational values (for each type of foot) of stressed syllables were smaller for G-2 (English by natives) than for G-3 (English by non-natives). Through use of a t-test, that difference proved to be significant (Table 4A). The same result obtains when we compare the global mean durational values of stressed syllables for the two groups of informants (Table 4B).

NSF	GROUP	N	MEAN DURATION	STANDARD DEVIATION	df	t-VALUE	PROB
1	G-2	22	244.58	63.64			
					52.42	-2.44	0.018
	G-3	37	290.98	80.75			
2	G-2	101	206.53	55.97			
					152.24	-4.94	0.000
	G-3	87	256.55	78.81			
3	G-2	172	200.56	52.98			
					281	-6.77	0.000
	G-3	111	247.73	63.39			
4	G-2	75	213.45	58.41			
					118	-2.17	0.032
	G-3	45	238.09	62.83			
5	G-2	30	178.10	54.37			
					58	-2.50	0.015
	G-3	30	214.94	56.10			
6	G-2	38	195.74	39.35			
					9.45	0.98	0.350
	G-3	11	225.97	80.34			

Table 4a: t-test to compare the partial mean durational values (for each type of foot) of stressed syllables for groups G-2 and G-3. The mean durations of stressed syllables for group G-2 are significantly shorter than those for group G-3, except 6-syllable feet, in which it is longer.

	GROUP	N	MEAN DURATION	STANDARD DEVIATION	df	t-VALUE	PROB
Tonic syllable	G-2	416	204.81	56.10	585.12	-9.36	0.000
	G-3	319	250.47	72.17			

Table 4b: t-test to compare the global mean duration of stressed syllables for groups G-2 and G-3. The mean duration of stressed syllables for group G-2 is shorter than that for group G-3.

Use of a t-test to compare the partial mean durational values of unstressed syllables (for each type of foot) for groups G-2 and G-3 yielded the same result: the mean durations for group G-3 were significantly greater than those for group G-2 (Table 5A). Comparison of the global mean durational values of unstressed syllables also gave the same result: the mean values were significantly greater for G-3 than for G-2 (Table 5B). A graphic representation of syllable duration for each type of foot is shown in Figure 2.

NSF	GROUP	N	MEAN DURATION	STANDARD DEVIATION	df	t-VALUE	PROB
1	G-2	—					
	G-3	—					
2	G-2	101	112.46	55.14	167.61	-4.59	0.000
	G-3	87	153.69	66.43			
3	G-2	172	111.71	38.10	169.10	-6.33	0.000
	G-3	111	149.59	58.63			
4	G-2	75	120.45	42.80	118	-2.87	0.005
	G-3	45	141.10	33.84			
5	G-2	30	97.93	23.86	58	-5.90	0.000
	G-3	30	135.85	25.84			
6	G-2	11	114.31	21.88	17	-3.535	0.003
	G-3	8	162.00	36.91			

Table 5a: t-test to compare the partial mean durational values (for each type of foot) of unstressed syllables for groups G-2 and G-3. The mean durations of unstressed syllables for group G-2 are shorter than those for G-3.

	GROUP	N	MEAN DURATION	STANDARD DEVIATION	df	t-VALUE	PROB
Non-tonic syllable	G-2	389	112.6	42.82	509.72	-9.18	0.000
	G-3	282	148.6	54.92			

Table 5b: t-test to compare the global mean duration of unstressed syllables for groups G-2 and G-3. The mean duration of unstressed syllables for group G-2 is shorter than that for group G-3.

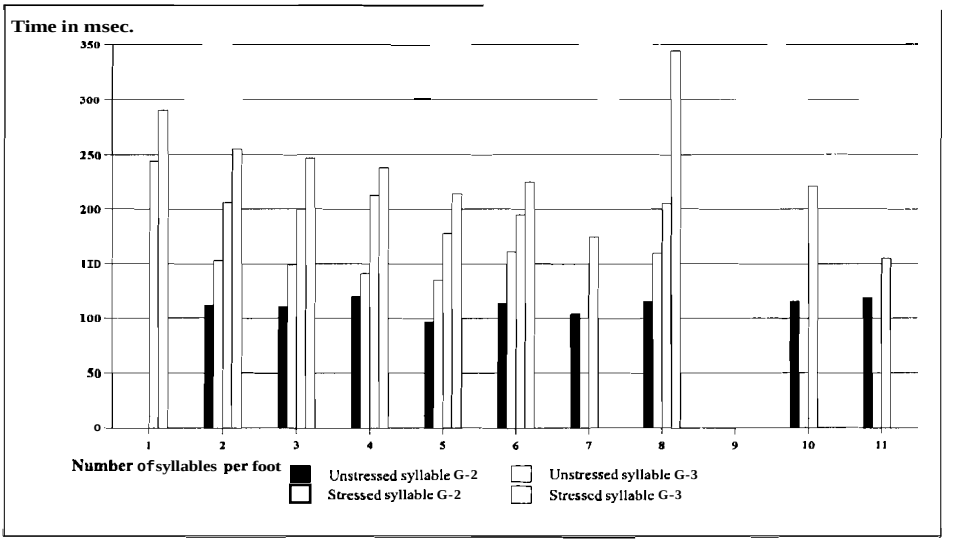

Figure 2: Comparison of tonic and non-tonic syllables by groups G-2 (English by native speakers) and G-3 (English by non-native speakers). Inter-group comparison showed a significant difference in length for both tonic and non-tonic syllables

Though this is not the right place for a detailed account of rhythmic feet and its parts as produced by G-2 and G-3, we would like simply to point out that the global mean durations of foot, ictus (i.e. stressed syllable) and remiss (all unstressed syllables in a foot) were significantly greater for our English learners (G-3) than for English native speakers (G-2). The reason for recalling such data of the broader original research is to give strength to our pedagogical explanation of the greater mean durations of all units involved in the speech of our group of English leamers in comparison to what happens in the speech of native speakers (G-2). That overall greater duration is a feature of our advanced leamers interlanguge that could be accounted for by a slower reading tempo —remember that the reading-aloud conditions were the same for both groups of speakers— most probably trigered by the learners' lack of fluency in the articulation of segmental sound sequences. It could not be attributed to faulty command of lexigrammatical contents, since, previous to the informants' reading aloud, the researcher made sure that that was not the case. Since that tempo error is also present in the first stages of first language acquisition —as long as learners have deficiencies related to mastery of linguistic components and to skill development—, we can safely assume that in the present case we are dealing with a developmental error related to the acquisition of English syllable timing and caused by a deficient command of canonical articulatory speed.

Comparison for each type of foot of the mean stressed/unstressed ratio for G-3 (1.90) with the ratio that obtained for G-2 (2.08) showed that the former is non-significantly greater than

the latter (see Table 6A). Comparison of the same ratios taken globally (i.e. independently of how they are distnbuted in different foot-types yealds a significantly greater ratio for G-2 (Table 6B). The interesting thing about the learners' ratio (1.90) is that it is intermediate at some point between the Spanish (G-1) and the English (G-2) ratios (2.08 and 1.52 respectively), and that begs an interpretation. Interference from their mother tongue would cause the learners's to fall short of meeting the target ratio; it looks like a weak interference though, since the target attained by the students (1.90) is nearer to the target ratio (2.08) than to the "departure ratio" of their mother tongue (1.52). Perhaps we could force Flege's (1981) hypothesis of ***Perceptual Target Approach*** to account for the result if we allow the learners' ratio to be interpreted as a "mixed perceptual target", i.e. a sort of compound of the ratios of both the first and the foreign language.

NSF	GROUP	N	MEAN RATIO	STANDARD DEVIATION	df	t-VALUE	PROB
1	G-2	—					
	G-3	—					
2	G-2	101	2.27	1.40			
					186	0.72	0.475
	G-3	87	2.12	1.51			
3	G-2	172	2.06	1.07			
					281	1.37	0.171
	G-3	111	1.89	0.91			
4	G-2	75	2.00	0.91			
					118	1.34	0.181
	G-3	45	1.79	0.71			
5	G-2	30	1.93	0.70			
					58	1.76	0.084
	G-3	30	1.64	0.55			
6	G-2	11	1.79	0.65			
					17	1.13	0.275
	G-3	8	1.45	0.64			

Table 6a: t-test to compare partial mean stressed/unstressed durational ratios for groups G-2 and G-3. The mean durational ratios for G-2 are significantly greater than the mean durational ratios for group G-3.

	GROUP	N	MEAN RATIO	STANDARD DEVIATION	df	t-VALUE	PROB
Ratio	G-2	389	2.08	1.11			
					674	-2.07	0.038
	G-3	282	1.90	1.08			

Table 6b: t-test to compare the global mean stressed/unstressed durational ratios (R) for groups G-2 and G-3 The ratios are significantly different ($P < 0{,}05\ \%$). Since H_0: R for G-2 = R for G-3, and H_1: R for G-2 ≠ R for G-3, we accept H_1: R for G-2 > R for G-3.

VII. CONCLUSIONS

We will end up by summarising the results and their interpretation:

1. *Conclusions related to syllable length in English and Spanish*

a. The meanduration oftonic syllables is significantly smaller in Spanish than in English.

b. The mean duration of unstressed syllables is the same in Spanish as in English.

c. A "contrastive perception" of English syllable timing by native speakers of Spanish could be at the basis of a long-standing prejudice among many Spanish teachers of English, who keep encouraging their pupils to make English unstressed syllables much shorter than they actually are.

d. The stressed/unstressed syllable durational ratio is significantly greater in English than in Spanish. The mother tongue-biased perception of such ratio could be behind the misperception of the duration of English unstressed syllables by Spanish native speakers' ears.

2. Conclusions related to syllable timing in the speech of the English learners

a. In the English speech of Spanish learners of English (group G-3) both stressed and unstressed syllables are significantly longer than the same syllables in the speech of native speakers of English. We consider that such difference can be attributed to a slower tempo in the speech of the former, which in turn is likely to be caused by a lack of full proficiency in the application of canonical articulatory speed, a deficiency also detected in our learners' production of other English speech units such as the rhythmic foot, ictus and remiss. This error is thus developmental.

b. Our learners' mean syllable durational ratio falls between the ratio for Spanish and the ratio for English as produced by their respective native speakers. It is significantly different from both the two others, but is nearer to the English ratio than to the Spanish. At this point our learner's interlanguage shows an atenuated interference or transfer error.

By way of a final observation, it is obvious that much more research is needed in support of a hypothesis that points to the same duration of unstressed syllables as a result of reading

aloud at normal speed in English and in Spanish. Bertinetto's stand about varying correlations between speaking rate and syllable duration should be tested in appropiate experiments using reading-aloud outputs in both languages using different language styles.

Psychoacoustic experimentation is also needed to test our hypothesis of 'contrastive perception of timing' as the basis for a 'contrastive perception of rhythm'. Such experimentation would have to aim at establishing the patteming of redistribution of the duration of different English segmental and suprasegmental units carried out by Spanish leamers of English during their perception of such units, including the role of transfer substitutions during the perceptual process. Of course the strength of the afore-mentioned hypotheses would be enhanced by testing them in experiments that include other pairs of (first and second) languages.

NOTES:

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2. An advantage of our ***corpora*** is the naturalness of their language in comparison with the use of distorted or non-linguistic materials in other studies (such as isolated words or non- linguistic stimuli inserted in carrier sentences).

APPENDIX

Fragment **of** the Spanish text

A: Entre las medidas urgentes, las fundamentales son ahora mismo construir viviendas de protección oficial y, especialmente las que vayan destinadas a aquellas personas que no tienen capital inicial.
B: Yo no estoy de acuerdo con usted, porque, ¡mire usted!, hay ayuntamientos que han clasificado mucho suelo y otros han clasificado poco; en todos por igual ha aumentado el precio de la vivienda y ha aumentado el precio del suelo. El mercado del suelo tiene sus características particulares como casi todos los mercados.

A: Se ha dicho siempre que en Espada la justicia era lenta, cara e insegura. ¿Sigue siendo así?.
B: Yo pienso que la justicia es lenta; es cierto que es lenta. No es quizás más lenta en Espada que en otros paises europeos. Yso esto siempre lo he dicho.
A: ¿Cómo observa la Presidenta de la Audiencia Provincial de Barcelona la puesta en funcionamiento del jurado popular?.

Fragment **of** the **English** text

A: How do you actually recommend people to relax? What's a good exercice for that?
B: Well I think the thing is you can't relax until you recognise tension. You've got to know when your neck is beginning to ache because you've looked down too long.
A: What would you recommend?
B: I believe in sensible eating. I think that so much has been written and talked about it that most of us know about food values and about the things that make us fat ...

A: Would it bother you if other people read your letter if you are not a Cabinet Minister?
B. Frankly, I don't think it would. They re listening to my telephone conversations. That's never bothered me. I've discovered that it's dangerous, and that the chemical process it goes through is as risky as the chemical processes that have been blowing up all over Europe.

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